

REMARKS

The necessary cross reference to Applicant's PCT application of which this is a 35 U.S.C. § 371 filing has been added. It was recited in the Application Data Sheet.

Claims 1-23 are currently pending. By the present *Response and Amendment* (hereinafter, "*Response*"), claims 1, 22 and 23 are amended without prejudice, and claim 3 is cancelled. These amendments are supported by the application as originally filed and do not introduce new matter issues or raise issues requiring further consideration or searches. Support in the specification for a mixture of vertical and horizontal alignment material can be found in the description at page 3, paragraph 42. Embodiments of vertical and horizontal alignment materials can be found, at in page 3, paragraphs 45, 46 and in page 4, paragraphs 53, 54.

The specification has been checked by Applicant's attorney.

REJECTION OF CLAIMS 1 – 4, 6 – 8, 11, 12, 14, 17, 18 AND 21 UNDER 35 U.S.C. § 102(e) AS BEING ANTICIPATED BY JONES (WO 03/102683 A1)

Claims 1 – 4, 6 – 8, 11, 12, 14, 17, 18 and 21 were rejected in the Office Action under 35 USC § 102(e) as anticipated by Jones (WO 03/102683 A1). To form the proper basis of rejection under 35 USC § 102(e), the Jones reference must teach each and every claimed limitation as recited in claim 1. Applicant has amended claim 1 to additionally recite that "at least one of said first and second alignment layers includes a mixture of vertical alignment material and horizontal alignment material". As the Jones reference does not expressly or impliedly disclose this claim limitation, it cannot anticipate claim 1 or claims 2 – 4, 6 – 8, 11, 12 and 14 which depend on claim 1.

Furthermore, Jones makes use of surface alignment grating to achieve the alignment of liquid crystal material as evident from what is disclosed in the Jones reference such as the patent title, FIGS. 6, 24, 25, 26, 28, 30 and the description/expression like "surface relief structures (e.g. a grating) in page 45, line 15, "it is preferred that the device uses zenithal bistable grating surfaces" in page 48, lines 14 – 15, "surface alignment grating" in page 47, lines 9 – 20 and "Examples of such surfaces include homeotropic bi-grating, grating grids, or other such gratings, or pseudo-random surface features (pillars or blind holes) with size, shape and spacing in a range that gives zenithal bistability" in page 48, lines 26 – 28. All

these direct to a structure known as grating and the Jones reference is silent on what is recited by claim 1 regarding “a mixture of vertical alignment material and horizontal alignment material”.

Consequently, Applicant respectfully requests the rejection of claim 1 under 35 USC § 102(e) be withdrawn. In addition, claims 2 – 4, 6 – 8, 11, 12 and 14 depend from an allowable claim 1 and as such the rejection of claims 2 – 4, 6 – 8, 11, 12 and 14 should be withdrawn as well and the claims be permitted to pass to allowance.

With respect to method claims 17, 18 and 21, the Office Action does not point out with particularity how the Jones reference in fact recites all method steps of the method of claim 17. Claim 17 recites a method comprising inducing a first and pretilt angle in the range of 20-65 degrees, aligning the liquid crystal layer followed by applying a switching energy. As the Jones reference does not explicitly teach all steps specifically disclosing the claimed ranges of claim 17, it cannot anticipate claim 17 or dependent claims 18 and 21 which depend from claim 17.

Consequently, Applicant respectfully requests the rejection of claim 17 under 35 USC § 102(e) be withdrawn. In addition, claims 18 and 21 depend from an allowable claim 17 and as such the rejection of claims 17, 18 and 21 should be withdrawn as well and the claims be permitted to pass to allowance.

In light of the preceding remarks, Applicant respectfully requests withdrawal of the rejection of claims 1 – 4, 6 – 8, 11, 12, 14, 17, 18 and 21 under 35 USC § 102(e) and requests that claims 1 – 4, 6 – 8, 11, 12, 14, 17, 18 and 21 be permitted to pass to allowance.

REJECTION OF CLAIMS 1, 2, 4, 5, 7 – 12 AND 14 – 22 UNDER 35 U.S.C. § 102(e) AS BEING  
ANTICIPATED BY BRYAN-BROWN ET AL. (US 2005/0062919 A1)

Claims 1, 2, 4, 5, 7 – 12 AND 14 – 22 were rejected in the Office Action under 35 USC § 102(e) as anticipated by BRYAN-BROWN ET AL. (US 2005/0062919 A1). To form the proper basis of rejection under 35 USC § 102(e), the Bryan-Brown reference must teach each and every claimed limitation as recited in claim 1. Applicant has amended claim 1 to additionally recite that “at least one of said first and second alignment layers comprises a mixture of vertical alignment material and horizontal alignment material.” As the Bryan-Brown reference does not expressly or impliedly disclose this claim limitation, it cannot anticipate claim 1 or claims 2, 4, 5, 7 – 12, 14 – 16 which depend from claim 1.

In general, Applicant respectfully notes that the Bryan-Brown reference teaches a

bistable display where the bistable states are the homogeneous state (horizontal alignment) and the hybrid alignment state (vertical on one side and horizontal on the other side). The presently claimed invention is distinguishable in that it is on a bistable device where the bistable states are the bend alignment and the splay alignment. As a result, these alignments are very different alignments from the homogeneous and hybrid alignment as disclosed in the Bryan-Brown reference. In particular, the molecular alignment diagrams Fig 2A and 2B in the instant application and Fig 4 and 5 in Bryan-Brown are illustrative and distinguish between the claimed invention and the reference. Due to these differences and others, the optical properties of all of these states are very different and as such the Bryan-Brown reference teaches an entirely different type of display device. Furthermore, the Bryan-Brown makes use of a surface alignment grating or a surface treatment to achieve the alignment of liquid crystal material as evident from the first 3 lines in the abstract which recites "A bistable nematic liquid crystal device cell is provided with a surface alignment grating on at least one cell wall and a surface treatment on the other wall" and in page 3, paragraph 57, it is stated that "prior to assembly, at least one of the cell walls 3, 4 are treated with alignment gratings to provide a bistable pretilt. Regarding the surface alignment grating, how it is made and how it can provide the pretilt angle are disclosed in page 3, paragraphs 61 – 64. Regarding the surface treatment, how it is made and how it can provide the pretilt angle are disclosed in page 4, paragraph 66, reciting "a monostable homeotropic surface 26. The latter surface 26 could, for example, be a flat photoresist surface coated with lecithin". All these direct to a structure known as grating and the Bryan-Brown reference is silent on what is recited by claim 1 regarding "a mixture of vertical alignment material and horizontal alignment material" and as lacking a recited element cannot anticipate claim 1 or the claims from which it depends.

With respect to method claims 17-21, the Office Action does not point out with particularity how the Bryan-Brown reference in fact recites all method steps of the method of claim 17. Claim 17 recites a method comprising inducing a first and second pretilt angle in the range of 20-65 degrees, aligning the liquid crystal layer followed by applying a switching energy. As the Bryan-Brown reference does not explicitly teach all steps specifically disclosing the claimed ranges of claim 17, it cannot anticipate claim 17 or dependent claims 18-21 which depend from claim 17.

Applicant has amended claim 22 to additionally recite that "at least one of said first and second alignment layers include a mixture of vertical alignment material and horizontal

alignment material.” As the Bryan-Brown reference does not expressly or impliedly disclose this claim limitation, it cannot anticipate claim 22 and applicant respectfully requests withdrawal of the same.

Consequently, Applicant respectfully requests the rejection of claims 1, 17 and 22 under 35 USC § 102(e) be withdrawn. In addition, claims 2, 4, 5, 7 – 12, 14 – 16 which depend on an allowable claim 1 and claims 18 – 21 which depend from an allowable claim 17 and as such the rejection of claims 2, 4, 5, 7 – 12, 14 – 16 and 18 – 21 should be withdrawn as well and the claims be permitted to pass to allowance.

In light of the preceding remarks, Applicant respectfully requests withdrawal of the rejection of claims 1 – 4, 6 – 8, 11, 12, 14, 17, 18-22 under 35 USC § 102(e) and requests that claims 1 – 4, 6 – 8, 11, 12, 14, 17, 18-22 be permitted to pass to allowance.

REJECTION OF CLAIMS 5, 13, AND 23 UNDER 35 U.S.C. § 103(a)

Claims 5, 13 and 23 were rejected in the *Office Action* under 35 U.S.C. § 103(a) with claim 5 being unpatentable over Jones (WO 03/102683) and claims 13 and 23 rejected in view of Bryan-Brown et al. (US 2005/0062919). Claim 5 recites “The device of claim 4 wherein said input and output polarizers respectively angle said alignment direction by  $\pm 40^\circ$  to  $\pm 60^\circ$ .” According to the Office Action, claim 5 is obvious in view of Jones. According to the Office Action the claimed alignment direction would have been uncovered using routine skill in the art. Applicant respectfully notes that the claimed ranges of  $\pm 40^\circ$  to  $\pm 60^\circ$  are not obvious owing to the fact that claim 5 depends from claim 4 which depends from claim 1. Applicant has amended claim 1 to additionally recite that “at least one of said first and second alignment layers comprises a mixture of vertical alignment material and horizontal alignment material”. The Jones reference does not expressly or implicitly teach this mixture, nor does it teach the entire range of the specific first and second pretilt angles as claimed in claim 1, with the Jones reference teaching away with its recitation of a high pretilt angle between 88-90 degrees at page 48 lines 11-17 in Jones as noted in the Office Action. In addition, there is no teaching in Jones which would lead one skilled in the art to modify the reference to arrive at the specific pretilt angles, mixture and alignment direction as claimed in claim 5. Consequently, as Jones does not teach the invention of claim 5 alone or by modification, the rejection of claim 5 under 35 U.S.C. § 103(a) is improper.

In addition, claims 13 and 23 were rejected in the *Office Action* under 35 U.S.C. § 103(a) as being unpatentable over Bryan-Brown et al. (US 2005/0062919). Claim 13 depends from claim 1 “wherein said first and second conductive layers are patterned into stripes that are substantially perpendicular in direction to each other to form an overlapping matrix of pixels.” Claim 13 was thought to be obvious in view of Bryan-Brown in the Office Action owing to the belief that one would have been motivated to change Bryan-Brown to the claimed arrangement “in order to obtain the desired switching arrangement.” Applicant has amended claim 1 from which claim 13 depends to additionally recite that “at least one of said first and second alignment layers includes a mixture of vertical alignment material and horizontal alignment material”. The Bryan-Brown reference does not expressly or implicitly teach this mixture, nor does it provide a motivation to modify the Bryan-Brown reference to arrive at the claimed invention of claim 13. Consequently, as Bryan-Brown does not teach the invention of claim 13 alone or by modification, the rejection of claim 13 under 35 U.S.C. § 103(a) is improper.

Furthermore, the use of interdigital structure is to provide a horizontal electric field for switching (see paragraph 67). The Bryan-Brown reference is silent on the use of a horizontal electric field, instead it uses a vertical electric field which is applied across the liquid crystal material layer (see paragraph 2). The fact that the electrodes are patterned in such a way is not merely desired to give the desired switching arrangement. According to paragraph 67 in Applicant’s specification, this is to provide the driving of the cell from the bend configuration to the splay configuration through a horizontal electric field. The Bryan-Brown reference does not expressly or implicitly teach this mixture, nor does it provide a motivation to modify the Bryan-Brown reference to arrive at the claimed invention of claim 13. Consequently, as Bryan-Brown does not teach the invention of claim 13 alone or by modification, the rejection of claim 13 under 35 U.S.C. § 103(a) is improper.

Independent claim 23 recites:

A bistable liquid crystal device comprising:  
a first substrate having thereon a first conductive layer and a first alignment layer;  
a second substrate having thereon a second conductive layer and a second alignment layer; and  
a liquid crystal layer sandwiched between said first and second alignment layers, said liquid crystal layer having a positive dielectric anisotropy and a cell gap-birefringence product of  $0.31\pm0.1\mu\text{m}$ , said first alignment layer inducing a first pretilt angle  $\theta_1$  in the range of  $20^\circ\text{--}65^\circ$  between said liquid crystal layer in contact with said first alignment layer, and said second alignment layer inducing a second pretilt angle  $\theta_2$  in the range of  $20^\circ\text{--}65^\circ$  between said liquid crystal layer in contact with said second alignment layer,

said liquid crystal layer

being either in a stable bend state or in a stable splay state at zero bias voltage; and  
being switchable between said stable bend state and said stable splay state when a  
switching energy is applied in operation to said liquid crystal layer.

Claim 23 recites the limitation of “a cell gap-birefringence product of  $0.31 \pm 0.1 \mu\text{m}$ ,” The Bryan-Brown reference does not recite a specific range but according to the Office Action the claimed range direction would have been uncovered using routine skill in the art. Applicant has amended claim 23 to additionally recite that “at least one of said first and second alignment layers includes a mixture of vertical alignment material and horizontal alignment material”. The Bryan-Brown reference does not expressly or implicitly teach this mixture, nor does it provide a motivation to modify the Bryan-Brown reference to arrive at the claimed invention of claim 23. Consequently, as Bryan-Brown does not teach the invention of claim 23 alone or by modification, the rejection of claim 23 under 35 U.S.C. § 103(a) is improper. Consequently, as Jones does not teach the invention of claim 23 alone or by modification the rejection of claim 23 under 35 U.S.C. § 103(a) is improper. In light of the preceding remarks, Applicant respectfully requests withdrawal of the rejection of claims 5, 13 and 23 under 35 USC § 103(a) and requests that claims 5, 13 and 23 be permitted to pass to allowance.

### CONCLUSION

By the present *Response*, the Application has been in placed in full condition for allowance. Accordingly, Applicant respectfully requests early and favorable action. Should the Examiner have any further questions or reservations, the Examiner is invited to telephone the undersigned Attorney.

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